

CLAIMS

1. A method of mounting conductive balls comprising:
 - a step of setting, on a substrate, a mask that includes a plurality of apertures for disposing conductive balls on the substrate; and
 - a filling step that includes using a head that moves along a surface of the mask, holding a group of conductive balls in an area that is part of the surface of the mask, and moving the area so that parts of a path taken by the area overlap.
2. The method of mounting according to Claim 1,
wherein the filling step further includes moving the area in a zigzag or a spiral path.
3. The method of mounting according to Claim 1,
wherein the filling step further includes gathering conductive balls by the head toward the area from around the area.
4. The method of mounting according to Claim 1,
wherein the area is circular or shaped like a polygon that circumscribes a circle.
5. The method of mounting according to Claim 1,
wherein the filling step further includes rotating the head about an axis that is perpendicular to the mask, moving the axis across the surface of the mask, and gathering conductive balls in the area by rotation of the head.
6. The method of mounting according to Claim 1,

wherein the filling step further includes rotating the head about an axis that is perpendicular to the mask, moving the axis across the surface of the mask, the area being a circular area that moves together with a center of rotation of the head, and sweeping part of the surface of the mask around the circular area by members protruding from the head or by blowing out gas to gather conductive balls in the area.

7. The method of mounting according to Claim 6,

wherein the filling step further includes pressing part of the mask around the area by the members protruding from the head or by the blowing out gas.

8. The method of mounting according to Claim 1,

wherein the filling step further includes rotating the head about an axis that is perpendicular to the mask, moving the axis across the surface of the mask, and sweeping part of the surface of the mask around the area by squeegees that protrude from the head toward the surface of the mask.

9. The method of mounting according to Claim 8,

wherein the filling step further includes pressing part of the mask around the area by the squeegees.

10. The method of mounting according to Claim 1,

wherein the filling step further includes sweeping part of the surface of the mask around the area by gas blown out from the head to gather conductive balls in the area.

11. A method of mounting conductive balls comprising:

a step of setting, on a substrate, a mask that includes a plurality of apertures for disposing conductive balls on the substrate; and

a filling step of moving a head for moving conductive balls along a surface of the mask so that at least parts of a path taken by the head overlap.

12. A method of mounting conductive balls comprising:

a step of setting, on a substrate, a mask that includes a plurality of apertures for disposing conductive balls on the substrate; and

a filling step that includes using a head that is movable along a surface of the mask, gathering conductive balls into an area that is part of the surface of the mask from around the area, and moving the area.

13. A filling device for filling conductive balls, after setting a mask on a substrate, in a plurality of apertures in the mask for disposing conductive balls on the substrate, the device comprising:

a head for holding a group of conductive balls in an area that is part of a surface of the mask; and

a head supporting means for supporting the head so as to move along the surface of the mask.

14. The filling device according to Claim 13, wherein the head supporting means moves the head across the surface of the mask in a direction that traces a zigzag or a direction that traces a spiral so that parts of a path taken by the area overlap.

15. The filling device according to Claim 13, wherein the head supporting means is capable of moving the head in every direction across the surface of the mask.

16. The filling device according to Claim 13, wherein the head includes a means for gathering conductive balls toward the area from around the area.
17. The filling device according to Claim 13, further comprising a means for supplying conductive balls to the area.
18. The filling device according to Claim 13, wherein the conductive balls are solder balls, gold balls, or copper balls with a diameter of around 30 to 300 μ m.
19. A mounting apparatus comprising:
 - a filling device according to Claim 13; and
 - a device for setting the mask on a substrate.
20. A filling device for filling conductive balls, after setting a mask on a substrate, in a plurality of apertures in the mask for disposing conductive balls on the substrate,
the device comprising:
 - a head including a means for gathering conductive balls toward an area that is part of a surface of the mask from around the area; and
 - a head supporting means for supporting the head so as to move along the surface of the mask.
21. The filling device according to Claim 20, wherein the head supporting means is capable of moving the head across the surface of the mask in at least one of an arbitrary direction, a direction that traces a zigzag, and a direction that traces a spiral.

22. The filling device according to Claim 20, wherein the head supporting means includes a means for rotating the head about a shaft that is perpendicular to the mask and a means for moving the shaft across the surface of the mask,

and the means for gathering conductive balls moves conductive balls, by rotating the head, toward the area that is a circular area centered on a center of rotation of the head.

23. The filling device according to Claim 22, wherein the means for gathering conductive balls is a sweeper for sweeping a part of the surface of the mask around the circular area by using members that protrude from the head or by blowing out gas.

24. The filling device according to Claim 23, wherein the sweeper presses the part of surface of the mask around the area by using the members that protrude from the head or by blowing out gas.

25. The filling device according to Claim 22, wherein the means for gathering conductive balls includes a plurality of squeegees that protrude from the head toward the surface of the mask and sweep a part of the surface of the mask around the circular area.

26. The filling device according to Claim 25, wherein the plurality of squeegees extend in a tangential direction for the circular area.

27. The filling device according to Claim 25, wherein the plurality of squeegees are arranged so as to overlap in a direction of movement thereof.

28. The filling device according to Claim 25, wherein the plurality of squeegees press the part of the surface of the mask the circular area.

29. The filling device according to Claim 20, wherein the means for gathering conductive balls includes a nozzle for sweeping together conductive balls by blowing out gas from the head to the around the area.

30. A mounting apparatus comprising:
a filling device according to Claim 20; and
a device for setting the mask on a substrate.

31. A filling device for filling conductive balls, after setting a mask on a substrate, in a plurality of apertures in the mask for disposing conductive balls on the substrate,
the device comprising:
a head for holding a group of conductive balls in an area that is part of a surface of the mask; and
a head supporting means for supporting the head so as to move with at least part of a path taken by the area overlap.

32. A mounting apparatus comprising:
a filling device according to Claim 31; and
a device for setting the mask on a substrate.

33. A head that moves across a surface of a mask, which includes a plurality of apertures for disposing conductive balls on a substrate, while rotating about an axis that is perpendicular to the mask, the head comprising

a means for gathering the conductive balls to a circular area around a center of rotation of the head when the head rotates.

34. A head according to Claim 33, wherein the means for gathering conductive balls is a sweeper for sweeping a part of the surface of the mask around the circular area by using members that protrude from the head or by blowing out gas.

35. A head according to Claim 34, wherein the sweeper presses the part of the surface of the mask around the circular area by using the members that protrude from the head or by the blowing out gas.